

MODEL

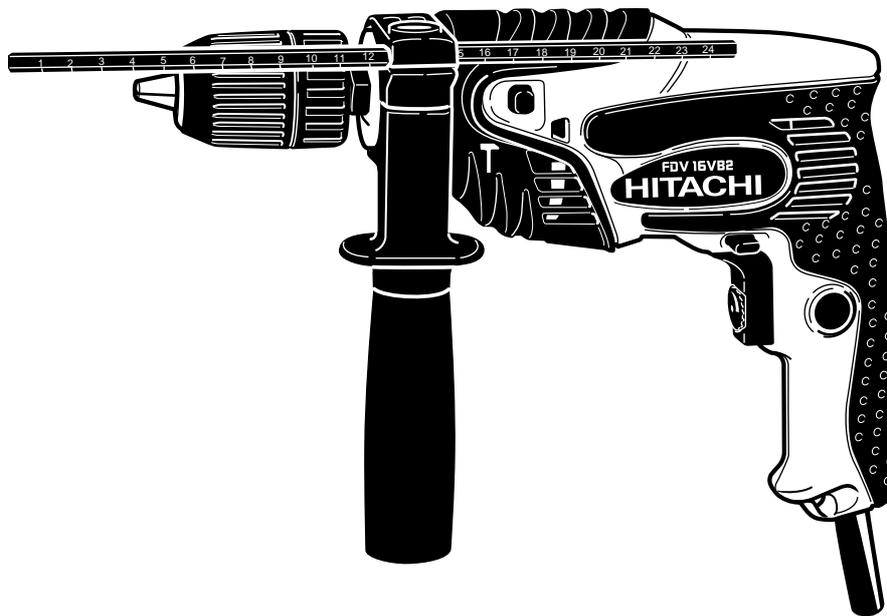
FDV 16VB2

Hitachi Power Tools

**IMPACT DRILL
FDV 16VB2**

**TECHNICAL DATA
AND
SERVICE MANUAL**

F



LIST No. F895

Jan. 2004

REMARK:

Throughout this TECHNICAL DATA AND SERVICE MANUAL, a symbol(s) is(are) used in the place of company name(s) and model name(s) of our competitor(s). The symbol(s) utilized here is(are) as follows:

Symbols Utilized	Competitors	
	Company Name	Model Name
C-1	MAKITA	HP1500
C-2	MAKITA	HP1501



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1. PRODUCT NAME

Hitachi Impact Drill, Model FDV 16VB2

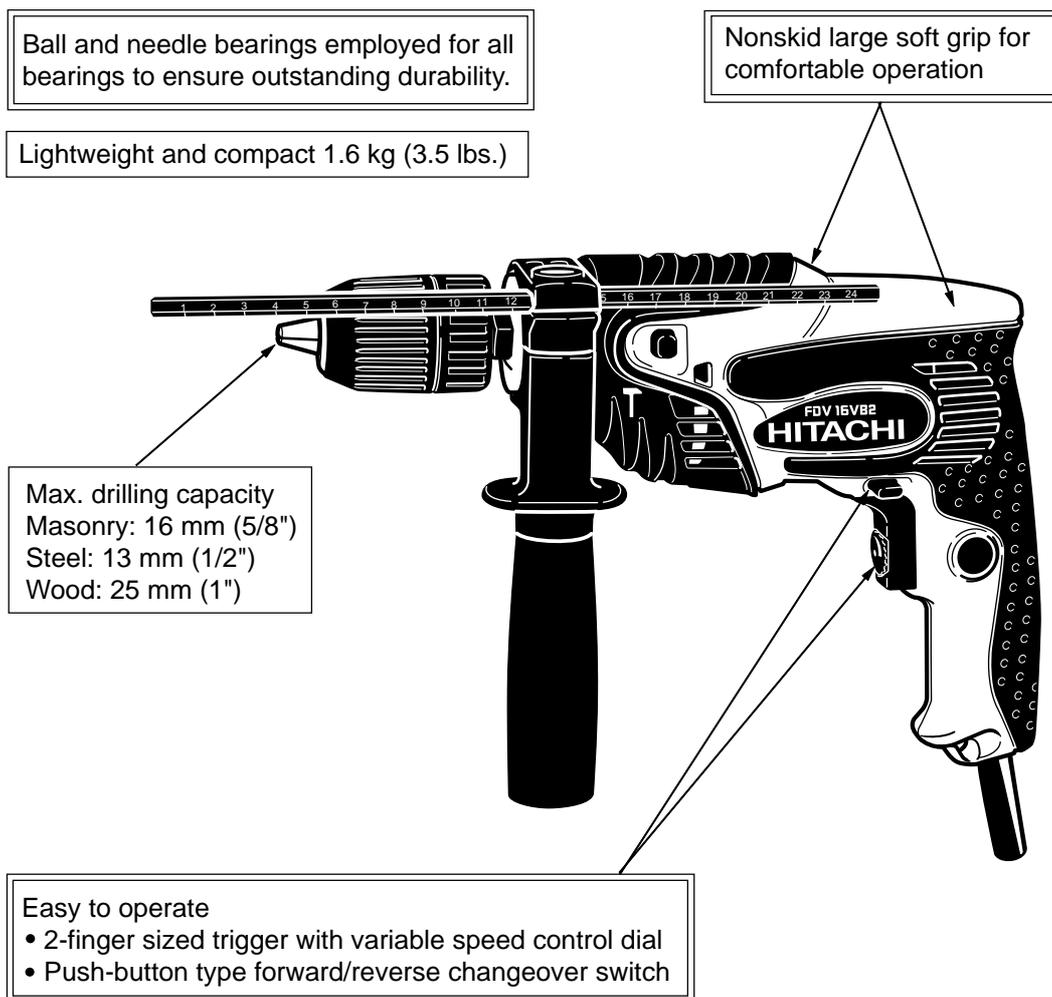
2. MARKETING OBJECTIVE

The new Model FDV 16VB2 is the upgraded version of the previous Model FDV 16VB, developed under the concept for more convenient model. Thanks to the nonskid large soft grip and the push-button type forward/reverse changeover switch, the Model FDV 16VB2 is easier to operate than the previous model.

3. APPLICATIONS

- When set for "Rotation + Impact"
Drilling holes in brick, concrete and similar materials
- When set for "Rotation only"
 - (1) Drilling holes in wood, metal, resin plate and similar materials
 - (2) Grinding, sanding and polishing of wood, metal and various other materials (with use of appropriate attachments)

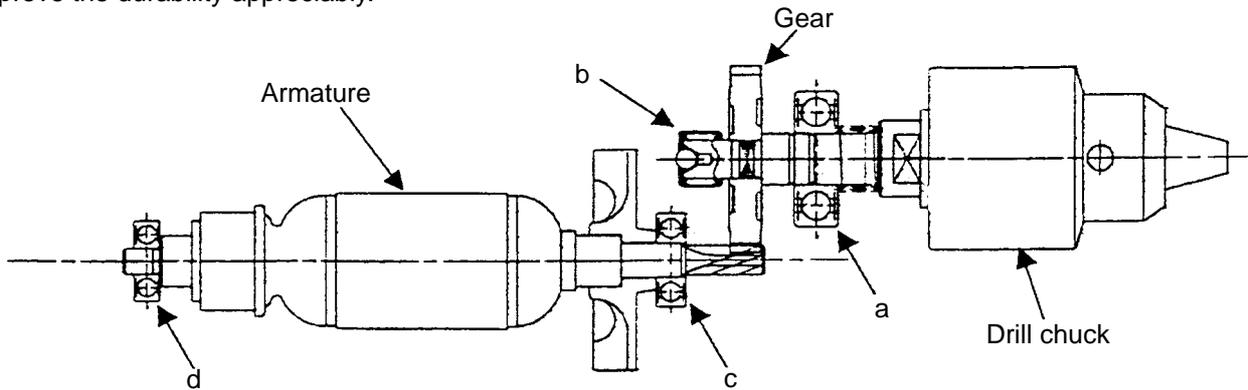
4. SELLING POINTS



4-1. Selling Point Descriptions

(1) Ball and needle bearings employed for all bearings to ensure outstanding durability.

One ball bearing and one needle bearing at the spindle and two ball bearings at the armature are employed to improve the durability appreciably.



Bearings	Maker	HITACHI		C-1, C-2
	Model	FDV 16VB2	FDV 16VB	
Spindle's bearing	a	Ball bearing		Ball bearing
	b	Needle bearing		Metal bearing
Armature's bearing	c	Ball bearing		Ball bearing
	d	Ball bearing		Ball bearing

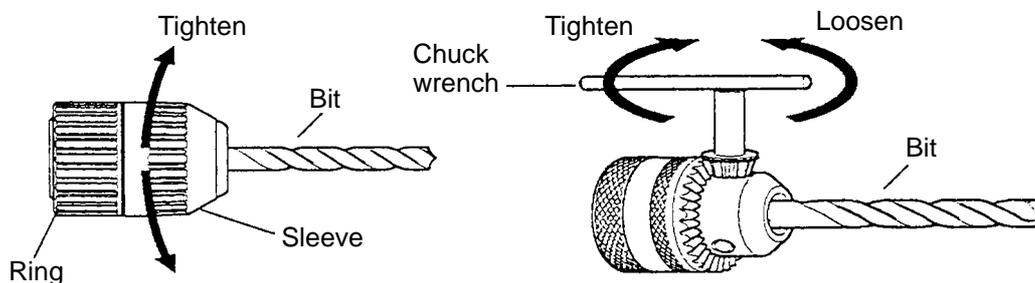
(2) Nonskid large soft grip

Most of the conventional soft grips cover only the handle. The Model FDV 16VB2 is equipped with the nonskid grip that largely covers both the handle and the housing (drill chuck side) to prevent slipping even if the operator holds the Model FDV 16VB2 in various ways.

(3) Keyless chuck for quick and easy replacement of accessory tools

Adoption of a keyless chuck in place of a conventional chuck means that the bothersome chuck wrench is no longer necessary, and that mounting and replacement of accessory tools is quicker and easier.

To mount or remove a bit from the keyless chuck, simply grasp the ring with one hand, and turn the sleeve with the other hand.



(4) Lightweight and compact

Bearings	Maker	HITACHI		C-1, C-2
	Model	FDV 16VB2	FDV 16VB	
Dimensions	Length	289 mm (11-3/8")	287 mm (11-3/8")	299 mm (11-3/4")
	Height	198 mm (7-7/8")	192 mm (7-5/8")	211 mm (8-3/8")
	Width	67 mm (2-5/8")	67 mm (2-5/8")	66 mm (2-5/8")
Weight		1.6 kg (3.5 lbs.)	1.6 kg (3.5 lbs.)	1.7 kg (3.7 lbs.)

(5) Easy to operate 2-finger sized trigger switch with variable speed control dial

The pulling amount of the trigger can be adjusted on the dial in the same manner as the Model FDV 16VB. It is convenient for operation keeping at desired speed. The large variable speed control dial and the 2-finger sized trigger switch are easy to operate.

(6) Easy-to-operate push-button type forward/reverse changeover switch

The Model FDV 16VB2 is equipped with the push-button type forward/reverse changeover switch that is more convenient and reliable than the lever-type switch. In addition, this switch is properly shaped and located not to make the pushing button an obstruction at drilling.

5. SPECIFICATIONS

5-1. Specifications

Capacities	Masonry	16 mm (5/8")		
	Steel	13 mm (1/2")		
	Wood	25 mm (1")		
Drill chuck	Type	Keyless	With chuck key	
	Mount type	UNF 1/2" – 20		
	Capacity	1.5 – 13 mm (1/16" to 1/2")		
Power source		AC single phase 50/60 Hz		
Rated voltage, current, input and output	Voltage (V)		Current (A)	Power input (W)
	110		5.3	550
	120		5.0	
	220		2.6	
	230		2.5	
	240		2.3	530
Speed	No-load	0 – 2,900/min.		
	Full-load	1,710/min.		
Impact rate	No-load	46,400/min.		
	Full-load	27,360/min.		
Type of motor		AC single phase series commutator motor		
Enclosure		Glassfiber reinforced polycarbonate resin + elastomer		
Insulation structure		Double insulation		
Type of switch		Variable speed control trigger switch with reversing switch		
Weight	Net (without cord)		1.6 kg (3.5 lbs.)	
	Gross	with case	3.6 kg (7.9 lbs.)	
		with carton box	2.3 kg (5.1 lbs.)	
Packaging	with case	Plastic case (in corrugated cardboard sleeve)		
	with carton box	Corrugated cardboard box		
Cord		2-core cabtire cord 2.5 m (8.2 feet)		
Standard accessories		Chuck wrench *1 1 Side handle 1 Depth stopper 1 Case *2..... 1		
Optional accessories		Item		Code No.
		TCT drill bit set (Dia. 4, 6, 8, 10) 1 each		879334
		HSS drill bit set (Dia. 2, 3.2, 4.8, 6.5) 1 each		879343
		Cross-recessed driver bit set (70L) (No. 1, 2, 3) .. 1 each		879347
		Slotted driver bit set (50L) (M4, M5, M6) 1 each		879350

*1 For the keyed chuck only

*2 Optional accessory in some regions

6. COMPARISONS WITH SIMILAR PRODUCTS

6-1. Specification Comparisons

				HITACHI				C-1/C-2	
				FDV 16VB2		FDV 16VB			
Catalog specification	Capacity	Masonry	mm	16 (5/8")		16 (5/8")		15 (5/8")	
		Steel	mm	13 (1/2")		13 (1/2")		13 (1/2")	
		Wood	mm	25 (1")		25 (1")		25 (1")	
	Drill chuck	Type		With key	Keyless	With key	Keyless	With key	Keyless
		Capacity	mm	13		13		13	
	Power input		W	550		550		550	
	Rated voltage and current* ²			120 V 5A		120 V 5A		120 V 5A	
	No-load rotation speed		/min ⁻¹	0 to 2900		0 to 2900		0 to 2800	
	No-load impact rate		bpm	0 to 46,400		0 to 46,400		0 to 44,800	
	Weight* ³		kg	1.6 (3.5 lbs)		1.6 (3.5 lbs)		1.7 (3.7 lbs)	
Actual weight* ³		kg	1.6 (3.5 lbs)		1.6 (3.5 lbs)		1.7 (3.7 lbs)		
Motor characteristics	Full-load output		W	328		328		317	
	Max. output		W	475		475		530	
	Max. torque		Nm	9.6 (85 in-lbs)		9.6 (85 in-lbs)		11.5 (101.8 in-lbs)	
	No-load sound pressure level		dB (A)	80		80		81	
Soft grip		–	○		×		×		
Type of reversing switch		–	Pushing button		Lever		Lever		
Speed control dial		–	○		○		×		
Dimensions	Length	mm	289 (11-3/8")		287 (11-3/8")		299 (11-3/4")		
	Height	mm	198 (7-7/8")		192 (7-5/8")		211 (8-3/8")		
	Width	mm	67 (2-5/8")		67 (2-5/8")		66 (2-5/8")		
Standard accessories			Chuck wrench Side handle Depth stopper Case* ¹		Chuck wrench Side handle Depth stopper Case* ¹		Chuck wrench Side handle Depth stopper		

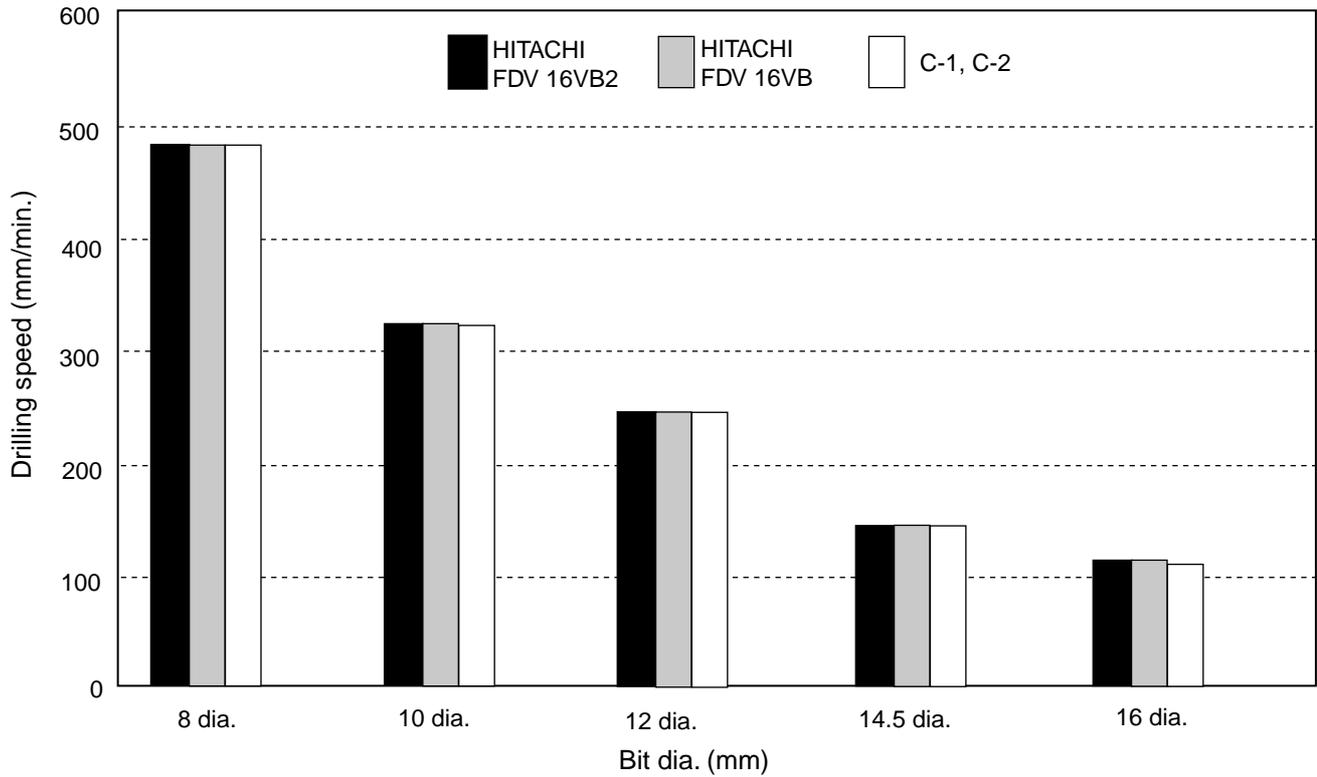
*¹ Optional accessory in some regions

*² For the U. S. A. and Canada only

*³ Without cord

6-2. Drilling Speed Comparisons

The data shown below were obtained in actual factory tests, and are for reference only. Actual drilling speeds may vary in accordance with operating conditions, operator skill, etc.



Test condition:

- Drill bit: Genuine parts
- Workpiece material: Concrete (compressive strength 240 kg/cm²)
- Drilling into concrete floor

7. PRECAUTIONS IN SALES PROMOTION

In the interest of promoting the safest and most efficient use of the Model FDV 16VB2 Impact Drill by all of our customers, it is very important that at the time of sales the salesperson carefully ensures that the buyer seriously recognizes the importance of the contents of the Handling Instructions, and fully understands the meaning of the precautions listed on the Caution Plate attached to each tool.

7-1. Handling Instructions

Although every effort is made in each step of design, manufacture and inspection to provide protection against safety hazards, the dangers inherent in the use of any electric power tool cannot be completely eliminated. Accordingly, general precautions and suggestions for the use of electric power tools, and specific precautions and suggestions for the use of the drills are listed in the Handling Instructions to enhance the safe, efficient use of the tool by the customer. Salespersons must be thoroughly familiar with the contents of the Handling Instructions to be able to offer appropriate guidance to the customer during sales promotion.

7-2. Caution Plate

The following basic safety precautions are listed on the Caution Plate attached to the main body of each tool.

(1) For Oceania and Asia

CAUTION

- Read thoroughly **HANDLING INSTRUCTIONS** before use.

(2) For the U.S.A. and Canada

WARNING

- To reduce the risk of injury, user must read and understand the instruction manual.

AVERTISSEMENT

- Afin de réduire le risque de blessures, l'utilisateur doit lire et bien comprendre le mode d'emploi.

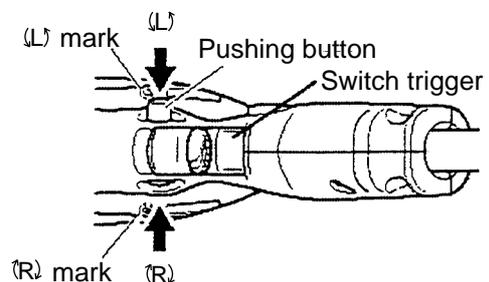
These precautions are not listed on the Name Plates of the products destined for Europe.

7-3. Precautions in Usage

(1) Direction of rotation

The bit rotates clockwise (viewed from the rear side) by pushing the R-side of the pushing button.

The L-side of the pushing button is pushed to turn the bit counterclockwise.



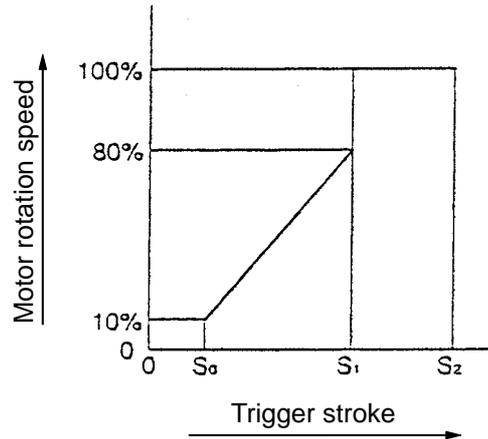
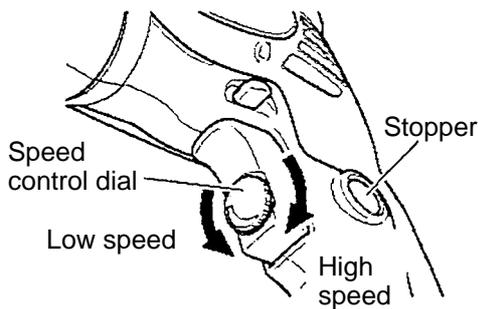
Never change the direction of bit rotation while operating. Turn the power switch OFF before changing the direction of bit rotation: otherwise, burning of the motor will result. Always use the impact drill with clockwise rotation, when using it as an impact drill.

(2) Speed control switch

The switch allows adjustment of the motor rotation within a range of about 10 % to 80 % of the full rotation speed by changing the trigger stroke. The trigger stroke can be set to a desired position by means of the stopper and micro-adjust knob.

The SCR incorporated in the switch for phase control of the power supply causes heat release to rise with increasing current.

When the switch is used at $S_0 - S_1$ in the figure below, keeping the switch energized with the motor locked will gradually raise the heat release from the SCR eventually to a level high enough to break the SCR. To avoid this, release the switch immediately, whenever the motor becomes jammed.

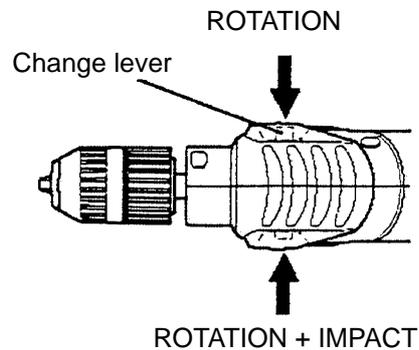


(3) Impact to rotation changeover

The impact drill can be switched from IMPACT (impact plus rotation) to ROTATION (rotation only) by rotating the change lever. When boring concrete, stone, tile or similar materials, sliding the change lever to IMPACT side. The drill head impacts against the material while continuing to rotate.

When boring metal, wood or plastic or tightening, sliding the change lever to ROTATION side, the drill rotates as an ordinary electric drill.

Instruct the customers to wait until the motor stops completely without fail before sliding the change lever.



(4) Be sure to push the pushing button to "R" for grinding operations, for instance with the drill chuck holding the sanding set or the mounted wheel.

8. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

Please follow the precautions below for disassembly and reassembly procedures.

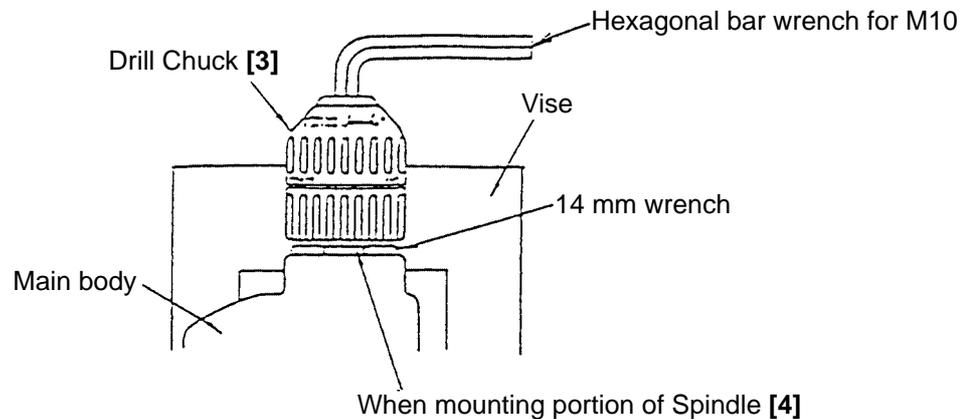
The **[Bold]** numbers in the descriptions below correspond to the item numbers in the Parts List and exploded assembly diagram.

8-1. Disassembly

8-1-1. Removal of the drill chuck

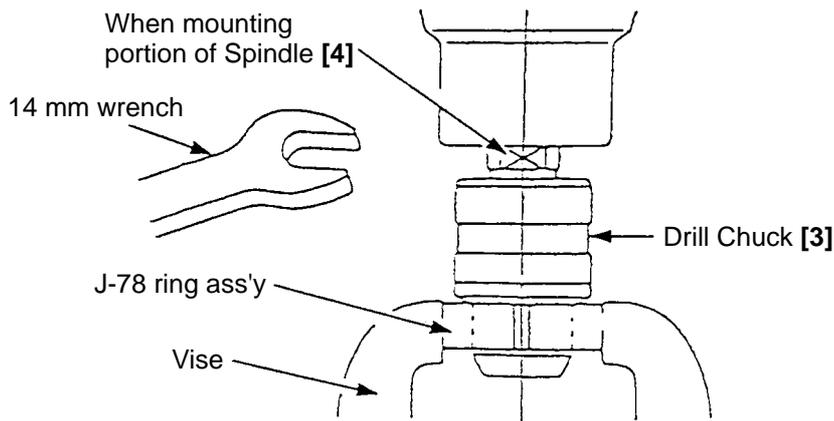
(1) For keyless chuck

The Drill Chuck **[3]** is fixed to the Spindle **[4]** with a UNF 1/2" – 20 right-hand thread and Flat Hd. Screw (A) (Left Hand) M6x 25 **[1]**. First, open the jaws of the keyless chuck fully. Insert a 14 mm wrench into the wrench mounting portion of the Spindle **[4]** and turn the Flat Hd. Screw (A) (Left Hand) M6 x 25 **[1]** clockwise to remove it. Then, fit the hexagonal bar wrench for M10 into the keyless chuck and turn it counterclockwise to loosen and remove the keyless chuck.



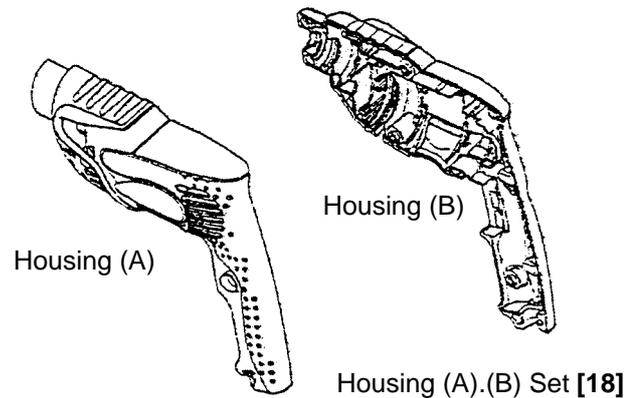
(2) For conventional chuck (with chuck wrench)

The Drill Chuck **[3]** is fixed to the Spindle **[4]** with a UNF 1/2" – 20 right-hand thread and Flat Hd. Screw (A) (Left Hand) M6x 25 **[1]**. As shown in the figure below, fit a J-78 ring ass'y (special repair tools, Code No. 970817 and 970818 are recommended) onto the drill chuck body, and secure it in a vise. At this time, ensure that the pin of the ring ass'y is properly inserted into the chuck wrench mounting hole of the chuck. Open the jaws of the Drill Chuck **[3]** fully and turn Flat Hd. Screw (A) (Left Hand) M6 x 25 **[1]** clockwise with a flat-blade screwdriver to remove it. Then, fit a 14 mm wrench to the flat surfaces on the spindle, and rotate it counterclockwise to loosen and remove the drill chuck.



8-1-2. Removal of housing (B) of Housing (A). (B) Set [18]

- (1) Remove the seven Tapping Screws (W/Flange) D4 x 20 [20] and take off housing (B) of Housing (A). (B) Set [18].



8-1-3. Disassembly of armature and stator

- (1) Remove the two Brush Holders [22] by lifting them upward from housing (A) of Housing (A). (B) Set [18] and take out the two Carbon Brushes [21].
- (2) With the Change Plate [11], the Change Knob [10] and Spindle (A) [12] installed, remove the Holder [13], the Armature [15], the Stator [16] and the Gear [8] all together.
- (3) Remove the Spindle [4] and the Gear [8] together from the Holder [13]. Be careful not to lose the Steel Ball D4.76 [9].
- (4) By pulling out the Armature [15] from the Holder [13], the Ball Bearing 608VVC2PS2L [14] can be removed together with the Armature. Remove the ball bearing from the armature with the bearing remover.
- (5) Remove the Internal Wires [24] [27] [34] [35] and the Choke Coils [23] [28] from the Stator [16].

8-1-4. Disassembly of holder, gear and spindle

- (1) Remove the Change Plate [11], the Change Knob [10] and Spring (A) [12] from the Holder [13].
- (2) By pushing the Spindle [4] toward the chuck while holding the chuck side surface of the Gear [8], the gear can be removed. By removing the Retaining Ring for D12 Shaft [7] from the Spindle [4], the Spring [5] and Ball Bearing 6201VVCMP2L [6] can be removed.

8-1-5. Disconnecting internal wires and electrical parts

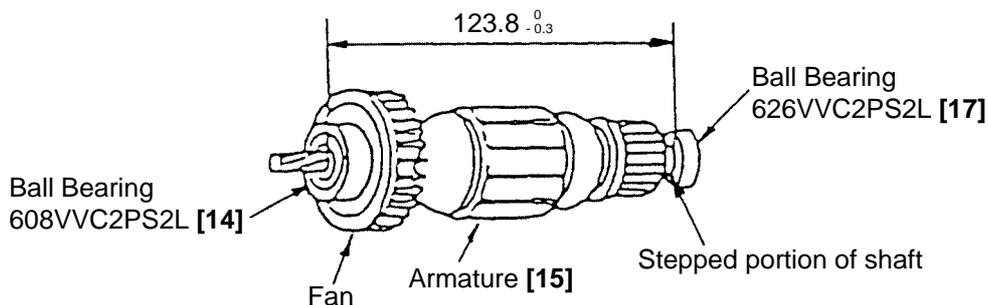
- (1) Disconnect the internal wires from the switch as follows. To disconnect the internal wires from switch, insert a small flat-blade screwdriver into the windows near the terminals and pull out the internal wires.
- (2) After removing the two Tapping Screws (W/Flange) D4x16 [32], the Cord [33] and the Cord Clip [31] can be removed from housing (A) of Housing (A). (B) Set [18].

8-2. Reassembly

Reassembly can be accomplished by following the disassembly procedures in reverse. However, special attention should be given to the following items.

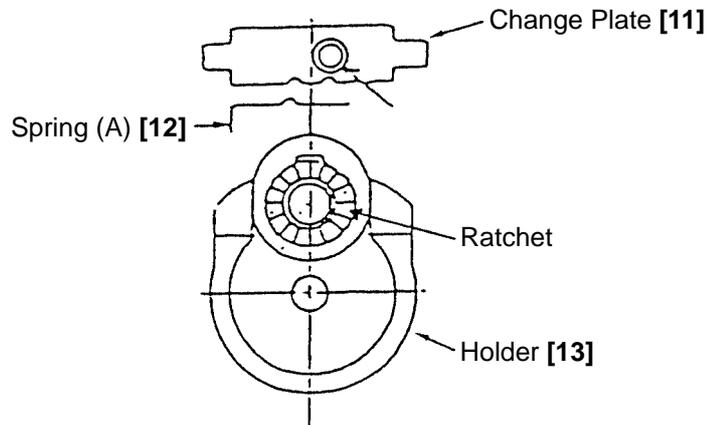
8-2-1. Reassembly of armature and stator

- (1) Press fit Ball Bearing 608VVC2PS2L [14] and Ball Bearing 626VVC2PS2L [17] onto the Armature [15]. Stop pressing when Ball Bearing 608VVC2PS2L [14] comes in contact with the fan. With a vernier caliper or similar tool, check that the press-fit dimension is $123.8^{0}_{-0.3}$ mm as shown in the following figure. As excessive press fitting can cause deformation or other damage to the fan, particular attention is required. Also, if press fitting is insufficient, it will cause loss of thrust of the Armature [15], resulting in heat generation. Accordingly, press-fit Ball Bearing 626VVC2PS2L [17] until it butts against the stepped portion of the shaft.



8-2-2. Reassembly of holder

- (1) When installing the Change Plate [11] and Spring (A) [12] to the Holder [13], be careful of the direction of each part.



- (2) Insert the Armature [15] and the gear spindle ass'y into the Holder [13] and insert them into the Stator [16]. Be sure to reassemble the Steel Ball D4.76 [9] at this time. Apply ATTOLUB MS No. 2 to the ball chamber of the Spindle [4] and then reassemble the Steel Ball D4.76 [9].
- (3) Install the reassembly from the above step (2) in housing (A) of Housing (A). (B) Set [18]. Check that the fan of the Armature [15] can be turned freely by finger.

8-2-3. Other

When re-mounting housing (A) of Housing (A). (B) Set [18], be very careful to ensure that the lead wires are not excessively slack, and that they are not pinched between components during reassembly.

8-3. Lubrication

(1) Apply ATTOLUB MS No. 2 (Code No. 309922) to the following.

- Holder [13]: Ratchet 1g
- Gear [8]: Teeth 2g
Ratchet 0.5 g
- Spindle [4]: Needle bearing contacting portion ... 1g
Ball chamber 0.5 g
- Armature [15]: Pinion 1g

8-4. Tightening Torque

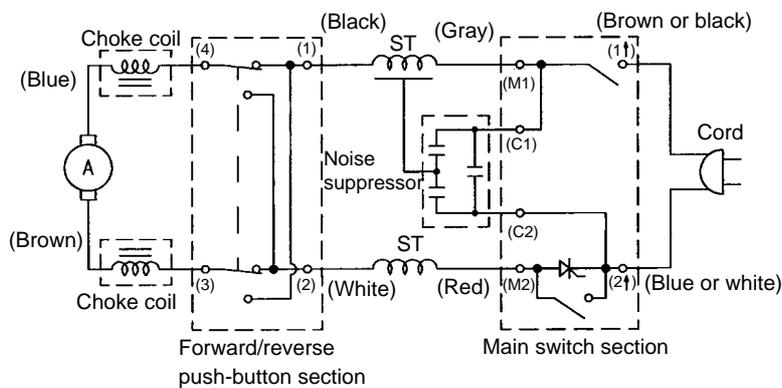
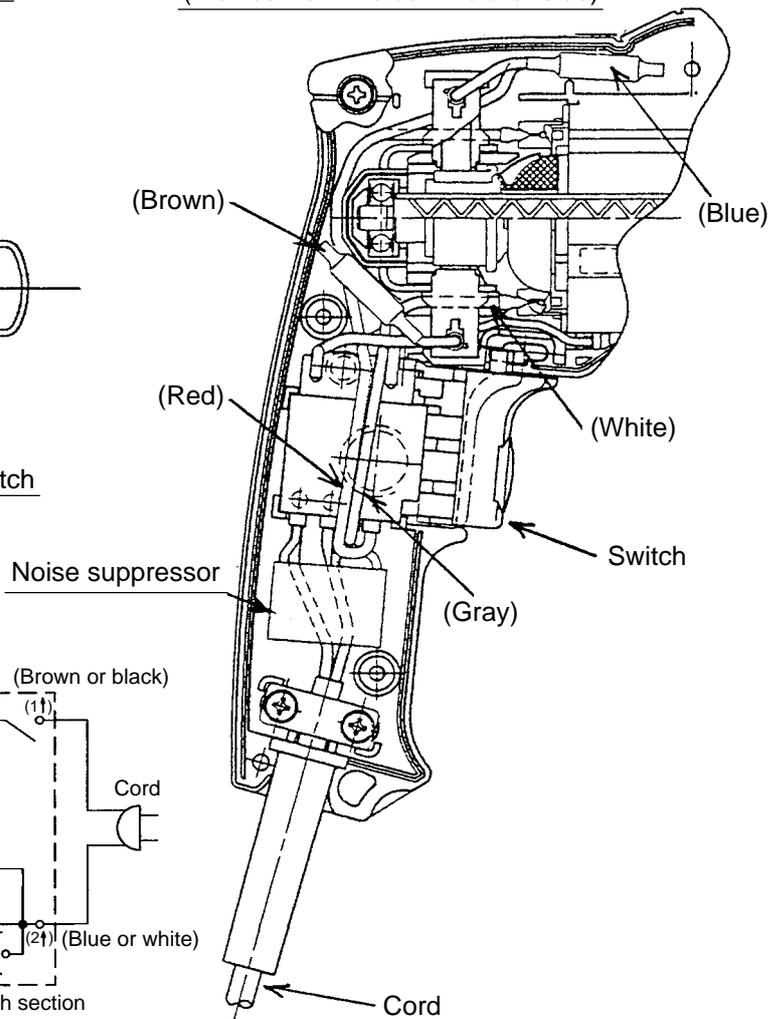
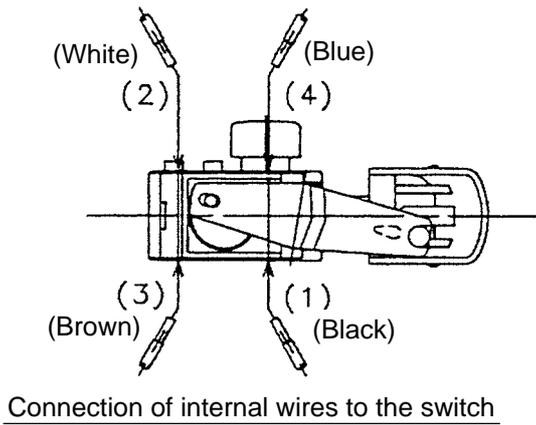
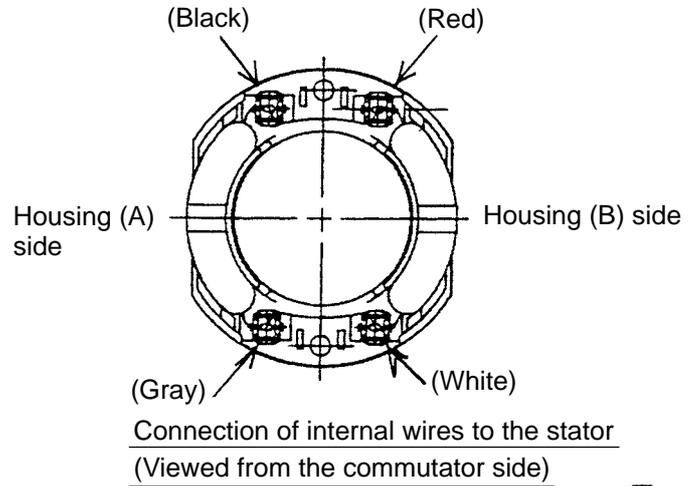
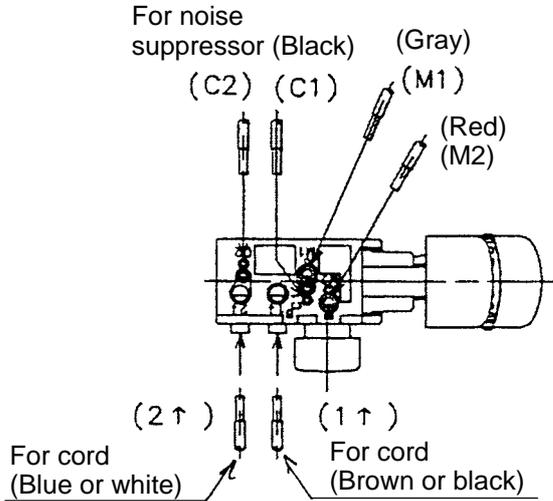
- Drill Chuck [3] 29.4 to 39.2 N•m (300 to 400 kgf•cm)
- Tapping Screw (W/Flange) D4 x 20 [20] }
• Tapping Screw (W/Flange) D4 x 16 [32] } 2.5 to 3.0 N•m (25 to 30 kgf•cm)

8-5. Wiring Diagram and Lead Wire Arrangements

Conduct wiring in accordance with the diagrams and arrangements illustrated below.

The symbols (1), (2), (3), (4), (M1), (M2), (C1), (C2), (1↑) and (2↑) in the diagrams correspond to switch terminal figures.

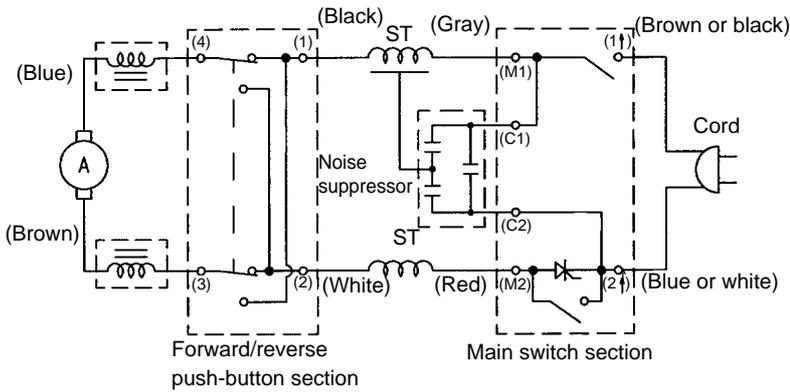
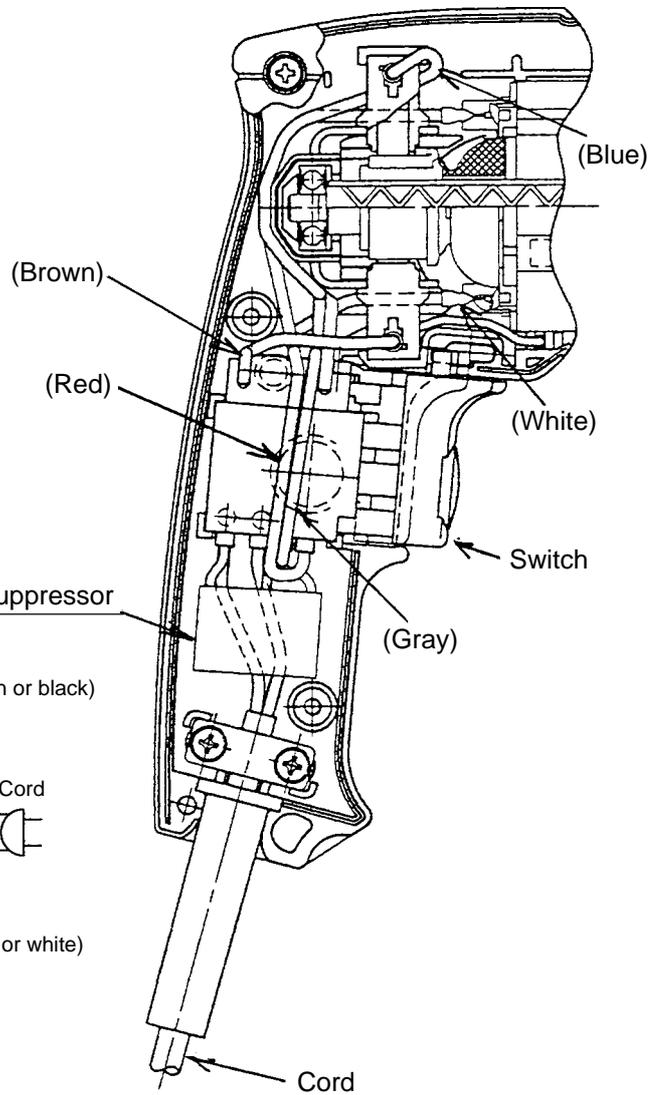
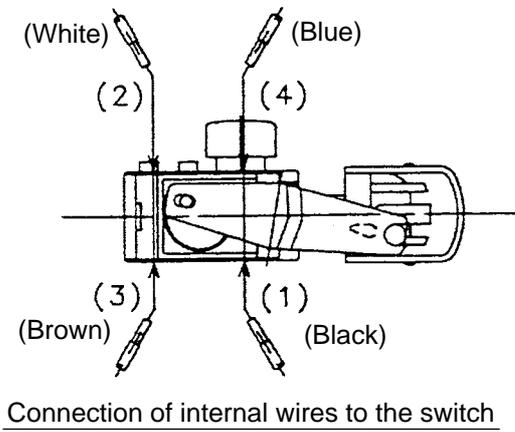
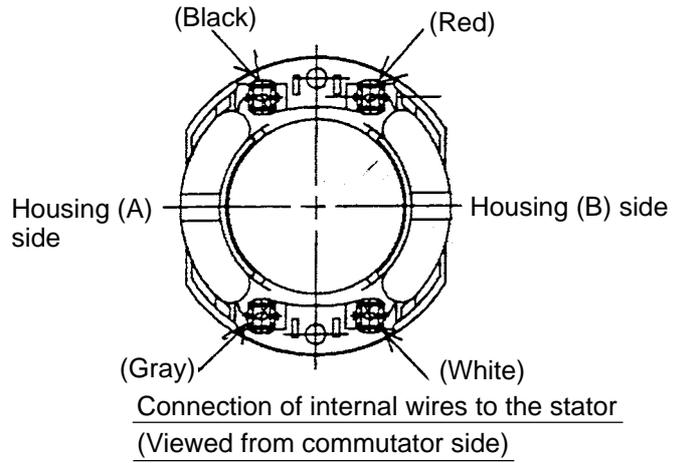
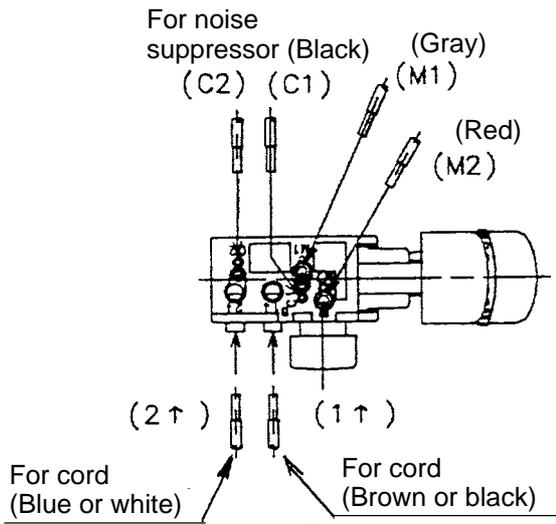
(1) For models with noise suppressor and choke coils



Wiring diagram

Wiring diagram

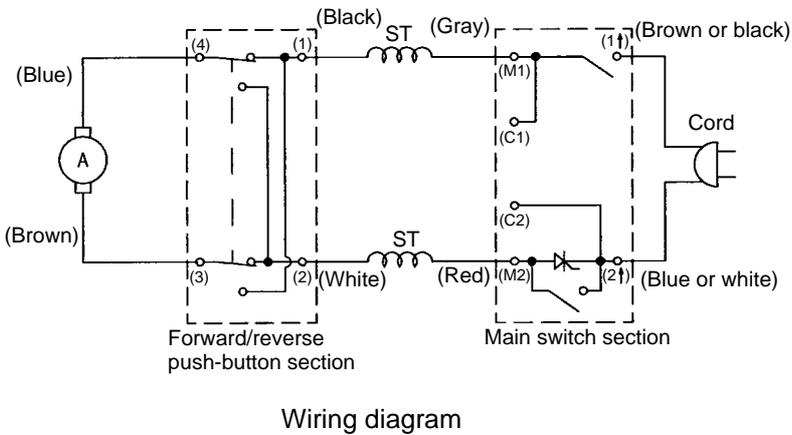
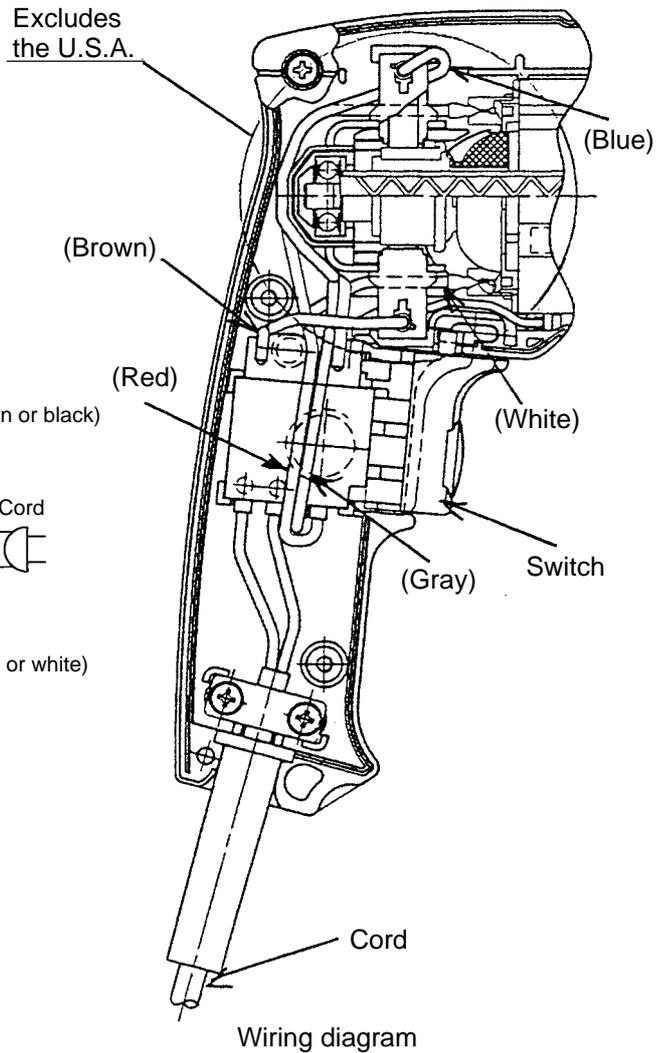
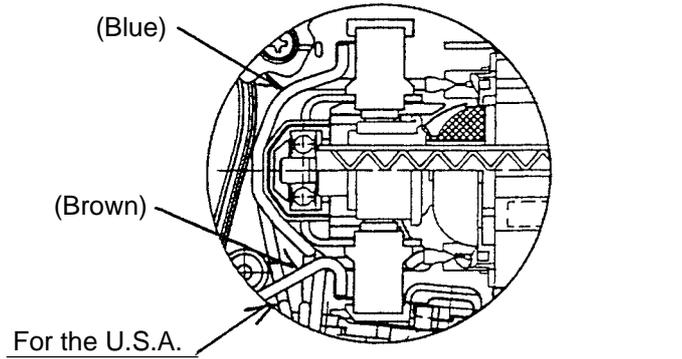
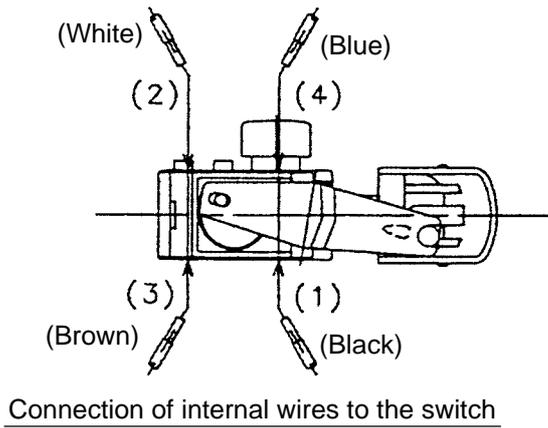
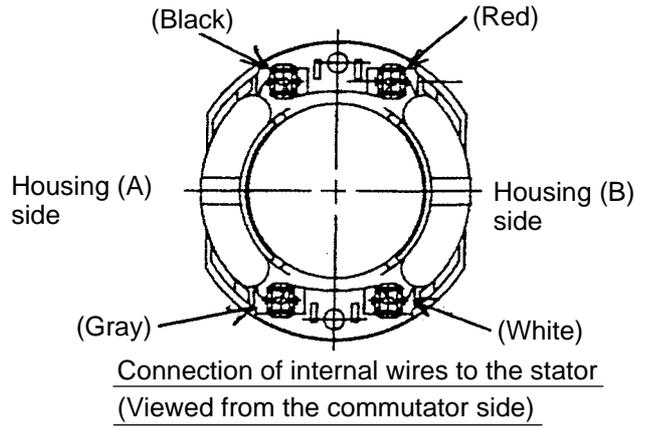
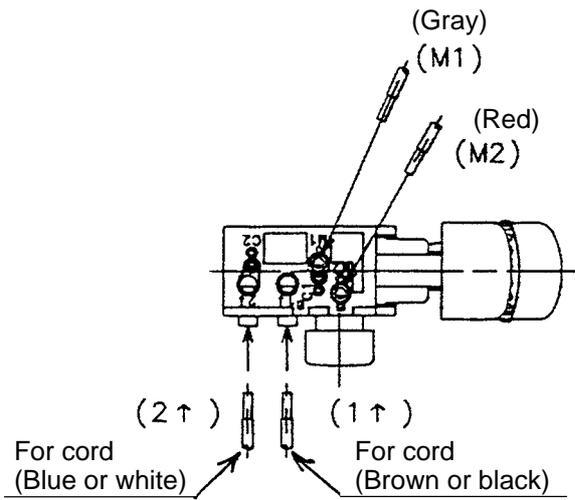
(2) For models with noise suppressor and without choke coils



Wiring diagram

Wiring diagram

(3) For models without noise suppressor and choke coils



8-6. Insulation Tests

On completion of disassembly and repair, measure the insulation resistance and the dielectric strength.

Insulation resistance: 7 M Ω or more with DC 500 V megohm tester

Dielectric strength:

AC 4,000 V/1 minute, with no abnormalities ... 220 V – 240 V (and 110 V for U.K. products)

AC 2,500 V/1 minute, with no abnormalities ... 110 V – 120 V

8-7. No-Load Current Values

After 30 minutes of no-load operation, current values should be as follows.

100 V }
120 V } ... Less than 2 A

220 V }
230 V } ... Less than 1 A
240 V }

9. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
FDV 16VB2		Work Flow						
		General Assembly	Drill Chuck Housing (A). (B) Set Spindle Ball Bearing (6201VV) Gear Change Plate Spring (A) Holder Ball Bearing (608VV) Armature Stator Ball Bearing (626VV) Switch Carbon Brush x 2 Cord Cord Armor					

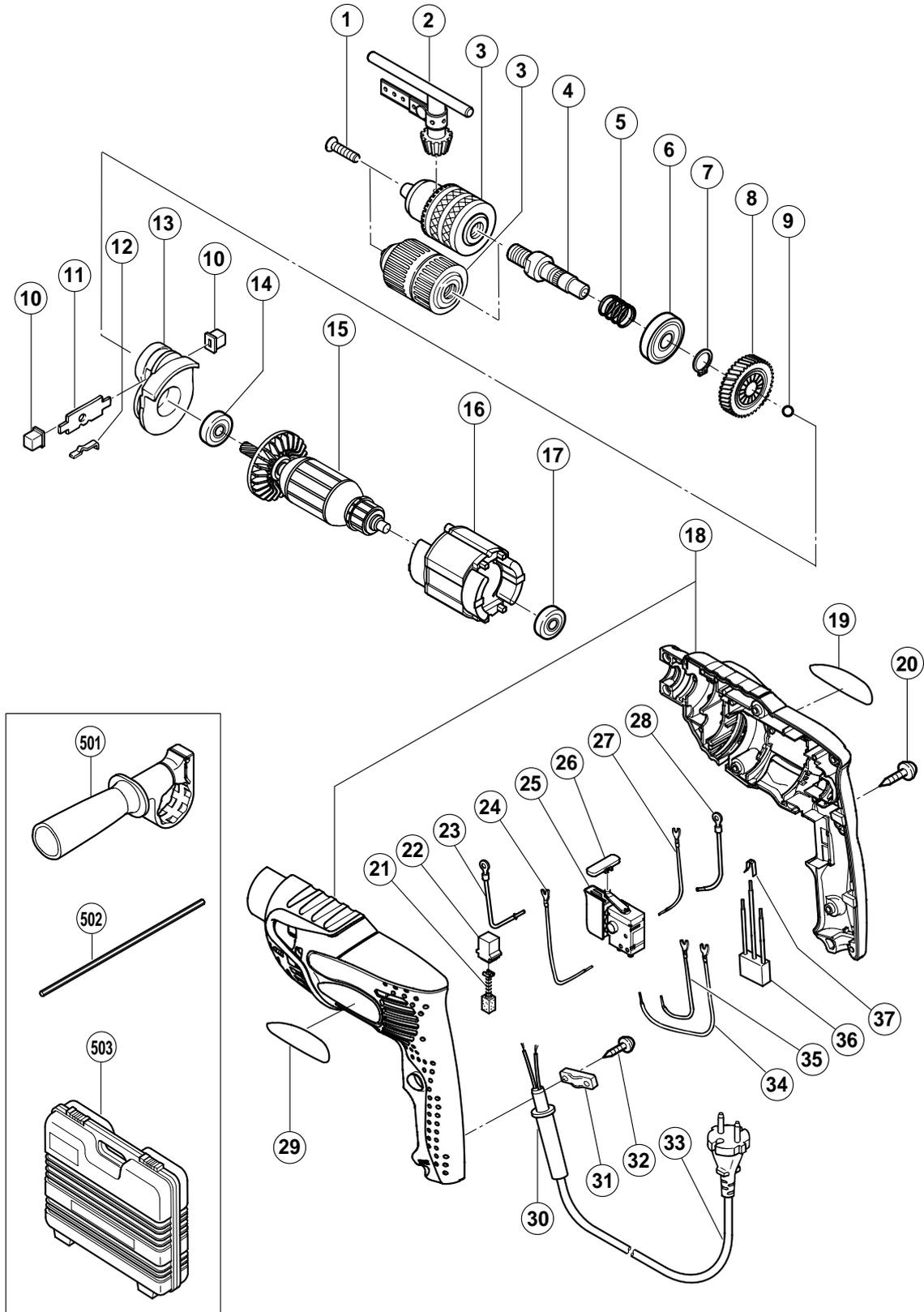
ELECTRIC TOOL PARTS LIST

IMPACT DRILL

2004 • 1 • 15

Model FDV 16VB2

(E1)



PARTS

FDV 16VB2

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
1	995-344	FLAT HD. SCREW (A) (LEFT HAND) M6X25	1	
* 2	987-576	CHUCK WRENCH FOR 13VLB-D,13VLR-D	1	
* 3		DRILL CHUCK 13VLRB-D	1	INCLUD. 2 SUPPLIED WITH ITEM NO. 601
* 3	322-625	DRILL CHUCK 13VLRJ-N (W/O CHUCK WRENCH)	1	
4	316-093	SPINDLE	1	
5	303-651	SPRING	1	
6	620-1VV	BALL BEARING 6201VVCMP2L	1	
7	939-542	RETAINING RING FOR D12 SHAFT (10 PCS.)	1	
8	317-482	GEAR	1	
9	959-149	STEEL BALL D4.76 (10 PCS.)	1	
10	319-604	CHANGE KNOB	2	
11	963-224	CHANGE PLATE	1	
12	963-226	SPRING (A)	1	
13	316-094	HOLDER	1	
14	608-VVM	BALL BEARING 608VVC2PS2L	1	
* 15	360-327U	ARMATURE ASS'Y 110V-120V	1	INCLUD. 14, 17
* 15	360-207E	ARMATURE 220V-230V	1	
* 15	360-207F	ARMATURE 230V-240V	1	FOR KUW, AUS
* 16	340-221	STATOR 100V-120V	1	
* 16	340-222E	STATOR 220V	1	
* 16	340-222F	STATOR 230V-240V	1	
17	626-VVM	BALL BEARING 626VVC2PS2L	1	
* 18	322-421	HOUSING (A).(B) SET (GREEN)	1	
* 18	322-626	HOUSING (A).(B) SET (MOSS GREEN)	1	
* 18	322-423	HOUSING (A).(B) SET (OFF BLACK GREEN)	1	
19		NAME PLATE	1	
20	302-086	TAPPING SCREW (W/FLANGE) D4X20 (BLACK)	7	
21	999-041	CARBON BRUSH (1 PAIR)	2	
* 22	930-483	BRUSH HOLDER	2	
* 22	955-203	BRUSH HOLDER	2	FOR USA, CAN
* 23	322-426	CHOKE COIL (BLUE)	1	FOR NZL, AUS, SAF, EUROPE, SUI, GBR (230V), CHN
* 23	322-427	CHOKE COIL (BLUE)	1	FOR TPE
* 23	322-429	INTERNAL WIRE (BLUE)	1	FOR THA, INA, IND, SIN, KUW, HKG, GBR (110V)
* 23	322-420	INTERNAL WIRE (BLUE)	1	FOR USA,CAN
24	322-418	INTERNAL WIRE (WHITE)	1	
25	321-632	SWITCH (1P PILLAR TYPE)	1	
26	321-628	PUSHING BUTTON	1	
27	322-417	INTERNAL WIRE (BLACK)	1	
* 28	322-424	CHOKE COIL (BROWN)	1	FOR NZL, AUS, SAF, EUROPE, SUI, GBR (230V), CHN
* 28	322-425	CHOKE COIL (BROWN)	1	FOR TPE
* 28	322-428	INTERNAL WIRE (BROWN)	1	FOR THA, INA, IND, SIN, KUW, HKG, GBR (110V)
* 28	322-419	INTERNAL WIRE (BROWN)	1	FOR USA, CAN
29		HITACHI LABEL	1	
* 30	307-217	CORD ARMOR D7.2	1	
* 30	303-662	CORD ARMOR D8.8	1	
31	960-266	CORD CLIP	1	
32	305-812	TAPPING SCREW (W/FLANGE) D4X16 (BLACK)	2	
* 33	303-667	CORD	1	
* 33	500-409Z	CORD	1	(CORD ARMOR D8.8) FOR INA, IND, SAF, EUROPE
* 33	500-423Z	CORD	1	(CORD ARMOR D8.8) FOR SIN, KUW
* 33	500-439Z	CORD	1	(CORD ARMOR D8.8) FOR NZL, AUS

